

REFRIGERATED STORAGE AND RIPENING OF IRRADIATED PAPAYA (SOLO 'SUNRISE')

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Solo type papaya (*Carica papaya* L.) at the mature green (MG) or one-quarter yellow (QY) stage of maturity were imported from Belize through the Port of Miami, Fla. The fruit were from groves that were certified Mediterranean fruit fly (*Ceratitis capitata*) free. Approved disinfestation treatment of papaya imported from Belize, Chile, Mexico, and Hawaii to the U.S. includes: 1) multistage high temperature forced air (HTFA), 2) single stage HTFA, 3) vapor heat, or 4) low dose irradiation (Hawaii only). Papaya harvested at MG to QY stage reportedly will tolerate irradiation at absorbed doses to 1.0 kGy. Papaya imported from Belize require storage during warehousing and transportation to markets in the U.S. and Canada. If the groves lost fly free certification then fruit would require quarantine treatment before entry into the U.S. Therefore, the purpose of our study was to treat Belize papaya with a mean dose of 0.675 kGy irradiation under commercial conditions and determine the optimum storage temperature for irradiated papayas.

The fruit were harvested into plastic field crates, taken to a local packinghouse, graded, sized and washed in chlorinated water and dipped in Thiabendazole (1ml·L⁻¹). Within 12 h of harvest, fruit were individually cushioned with kraft type paper into commercial fiberboard papaya boxes. Palletized units were forced-air cooled for 4 h, and retained in cold storage (11 °C) until loading into refrigerated marine containers for weekly shipments to the U.S. MG and QY fruit lots were obtained from three separate shipments at 2-week intervals. Each lot consisted of 16 boxes (10 fruit each), or 32 boxes per shipment. The experimental design was a 2 (MG or QY stage of maturity) by 2 (irradiated or not) by 4 (storage at 25 °C, or 10, 12, 15 °C for 7 days then ripened at 25 °C) factorial replicated over three shipment lots of fruit that were harvested from the same grove. Significant differences among treatment means for each quality or condition attribute were determined by SAS (PROC ANOVA, Gary, NC) at the final evaluation.

Fruit were transported to the U.S. Horticultural Research Laboratory in Orlando, Fla. for treatment preparation and irradiated at 0.12 kGy·min⁻¹ by a ⁶⁰Co source (Food Technology Services Inc., Mulberry, Fla.). After treatment, both irradiated fruit and nonirradiated control fruit were placed under one of four storage regimes: 25 °C until reaching the eating ripe stage, 10, 12, or 15 °C for 7 days and then 25 °C until reaching the eating ripe stage. Fruit held at 25 °C were observed daily and evaluated for subjective peel color and pulp firmness to determine time to reach the eating ripe stage. Fruit were weighed initially and weighed again at the eating ripe stage to determine weight loss, and evaluated for the quality characteristics of peel scald, pulp lumpiness, decay, objective firmness, pulp color and flavor. Total soluble solids were determined.

Incidence and severity of scald. Fruit maturity did not influence the incidence of scald for nonirradiated fruit, but irradiated QY had a higher incidence than MG irradiated fruit. The incidence and severity of scald increased as storage temperature decreased.

Pulp lumpiness (uneven softening). QY fruit were more lumpy than MG fruit except for irradiated MG fruit held at 10 °C. Fruit held and ripened at 25 °C had less scald whether irradiated or not than fruit stored at low temperatures and then ripened.

Decay. Decay was caused by Anthracnose sp. or stem-end-rot organisms. MG nonirradiated fruit had less decay regardless of storage regime, but decay increased in fruit as storage temperature increased. QY fruit had more decay than MG fruit regardless of irradiation or storage temperature.

Firmness. The firmness of MG fruit were not affected by storage temperature, but the firmness of QY fruit was reduced as storage temperature increased. Irradiated fruit were firmer at the ripe stage than those not irradiated, except for fruit stored at 15 °C.

Pulp color. For all storage conditions QY fruit had lighter color (higher L* value) than MG fruit after ripening. Irradiated fruit were more yellow than nonirradiated fruit. The magnitude of differences in color values among treatments were small.

Weight loss (WL). Mean weight loss for MG and QY was 5.0% and 6.2%, respectively. WL was not affected by irradiation treatment. WL for fruit ripened at 25 °C was 4.1%, and those held at 10, 12, or 15 °C and then ripened were 5.8, 6.0, or 6.7%, respectively.

TSS, flavor, and texture. Overall mean TSS was 12.3%. MG fruit had slightly higher TSS than QY fruit at the eating ripe stage. Some fruit held at 10 °C and then ripened were less than full flavor and the consistency of the inter-mesocarp tissue of these fruit tended to be slightly mushy. All other fruit had acceptable flavor at the eating ripe stage.

Days to ripen. Mean days for fruit to ripen after they were placed at 25 °C was about 5 days. MG fruit ripened slightly faster than QY fruit. Irradiation treatment delayed ripening, except for fruit held at 10 °C.

Whether irradiated or not, papaya should not be stored below 12 °C prior to ripening at 25 °C. Cold storage of irradiated papaya will increase lumpiness of fruit. At the eating ripe stage irradiated fruit will have firmer pulp than those not treated.